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# Health related quality of life, mood disorders and coping abilities in an unselected sample of patients with primary lung cancer

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## KEYWORDS

Primary pulmonary carcinoma;  
Health related quality of life;  
Anxiety;  
Depression;  
Sense of coherence

## Summary

**Background:** Health related quality of life (HRQL), mood disorders and coping abilities have previously not been evaluated in an unselected sample of patients with primary lung cancer.

**Design:** A prospective study was performed on all patients diagnosed with primary lung cancer in Southern Norway from 2002 to 2005. HRQL was assessed according to EORTC, anxiety and depression according to HAD and coping ability according to SoC.

**Results:** Fatigue and sore mouth were more pronounced in SCLC than in NSCLC. Besides this, there were no difference in EORTC scores between histological groups. Non-responders to EORTC were older and more than twice as many had poor performance status compared to those answering. According to HAD, 17% of patients scored compatible with anxiety and 14% with depression, and one in four consistent with manifest anxiety and/or depression. Mean SoC score was 58.3. A HAD score compatible with anxiety or depression was associated with considerably worse EORTC function scores. A reduced coping ability according to SoC was only weakly associated with anxiety and depression. These scores are poorer than that recorded in selected EORTC databases from chemotherapy and radiotherapy studies.

**Conclusion:** In this real-life survey on unselected patients with newly diagnosed lung cancer, mean HRQL scores were poorer than reference values from previous, treatment-based studies, documenting a higher burden of illness in lung cancer than previously documented. Anxiety and depression are common in lung cancer and are clearly related to reduced quality of life. From the clinical point of view, an increased focus on information when lung cancer is diagnosed, seems justified, as well as specific attention for patients with lung cancer with accompanying mood disorders.

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## Introduction

Lung cancer is the most lethal of cancers for both genders in the western world today, and the incidence still increases. Treatment, though offered more frequently today than 20 years ago, has not improved the five-year survival noticeably. However, palliative treatment regimes have become less toxic, thereby improving quality of life during treatment. Thus, health related quality of life (HRQL) has become increasingly more important as an end point in lung cancer research. Recent investigations also emphasize the importance of mood aspects in cancer research.<sup>1,2</sup>

People's life experiences influence their perception of illness and symptoms, as well as their susceptibility to information. Thus, coping ability may explain some variability in patients' perception of given information and actual symptoms.<sup>3</sup> Coping ability is thought to be a rather stable trait, and to be acquired early in life.<sup>4</sup> Antonovsky defines coping ability/sense of coherence as: "a global orientation that expresses the extent to which one has a pervasive, enduring though dynamic feeling of confidence that the stimuli deriving from one's internal and external environments in the course of living are structured, predictable, and explicable".<sup>4</sup>

Significant correlations have previously been found between HRQL and mood disorders following surgery for lung cancer, using a generic measure of Quality of life (HRQL), the SF36,<sup>5</sup> and the Hospital Anxiety and Depression Scale (HAD). Further, Hoench et al. recently reported a correlation between HRQL and both depression and coping abilities in patients with lung cancer in a purely palliative setting.<sup>1</sup>

Thus, the aims of this study were (i) to assess HRQL, anxiety and depression and coping abilities in an unselected population of patients with newly diagnosed primary lung cancer, (ii) to characterize responders and non-responders to these questionnaires, (iii) to test possible associations between HRQL, HAD and coping abilities and (iv) to compare our results with previous studies.

## Method

This prospective study included all patients diagnosed with primary lung cancer in Southern Norway, i.e., the Aust-Agder and Vest-Agder counties, between June 14th 2002 and June 13th 2005.

There are two main hospitals in Southern Norway serving all patients with pulmonary carcinoma and together offering all regular treatment modalities. When the patients were informed about their disease, the physicians also invited them to participate in the study, and if willing, written informed consents were collected and questionnaires answered immediately or mailed to the patient, i.e.

- (i) a health related quality of life (HRQL) questionnaire; The European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 (EORTC QLQ-C30) and its Lung Cancer specific module (QLQ LC13),
- (ii) a questionnaire assessing emotions; the Hospital Anxiety and Depression Scale (HAD), and

- (iii) Thirteen questions on coping abilities; the Sense of Coherence questionnaire (SoC).

EORTC and HAD questionnaires answered more than two weeks after the date of informed diagnosis were excluded from baseline assessment. However, SoC questionnaires answered also somewhat later were included in baseline data due to the documented stable nature of coping abilities over time.

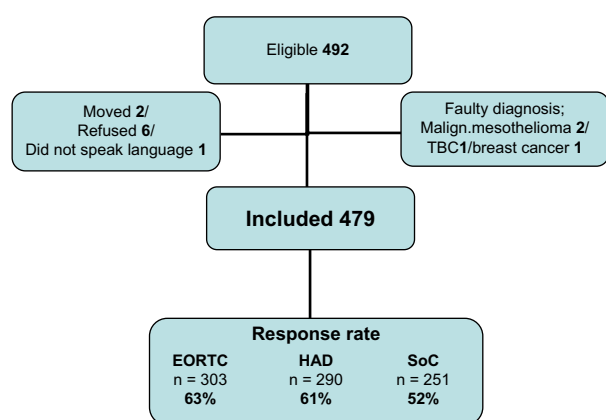
The EORTC QLQ-C30 judged to be a valid, reliable and reproducible instrument,<sup>6-9</sup> has been used in many clinical studies,<sup>10,11</sup> contains all important aspects of cancer related HRQL<sup>12</sup> and consists of five functional scales (physical, role, emotional, cognitive and social) and one global health and quality of life scale, for which a high score means a high level of functioning. Additionally, it has three symptom scales (fatigue, pain and nausea/vomiting) and six single symptom items (dyspnoea, constipation, diarrhoea, insomnia, appetite loss and financial difficulties) for which a high score represents a high degree of symptoms. The QLQ LC13 measures another 13 disease- and treatment specific symptoms. The QLQ-C30 and QLQ LC13 answers were, according to EORTC instructions,<sup>13</sup> converted into scales from 0 to 100. A difference of more than 10 points or 10% in EORTC scores is often considered clinically significant.<sup>14</sup> Single missing answers were imputed according to the EORTC scoring instructions in cases where at least half the items of each multi-item scale had been answered. Single items could not be supplemented.

The HAD questionnaire consists of 14 items of which half and half assess anxiety and depression, respectively. Each sub-score may vary from 0 to 21 points. The questionnaire has been widely tested.<sup>15,16</sup> The scoring instructions for the HAD-scale suggest that  $\geq 8$  points are equivalent to possible/borderline psychiatric disease, while  $\geq 11$  points indicate clinical depression or anxiety associated neurosis,<sup>16</sup> as reported in several other studies.<sup>15,17</sup> Missing values were, according to the HAD instructions, replaced with the mean of the other values for anxiety or depression, rounded off to nearest whole number, if four values or less were missing.

The SoC questionnaire, as invented by Antonovsky, has been proved valid and reliable,<sup>18</sup> and is widely used throughout the world,<sup>19,20</sup> also in Norway.<sup>3</sup> The answers of the 13-item version were coded as instructed with values from 1 (weak coping ability) to 7 (strong coping ability). Total score resulted from summing up raw scores, and could range from 13 to 91. High values indicate high coping abilities.

## Statistical methods

Statistical descriptive analyses were performed with SPSS 13 (Statistical package for Social Sciences, SPSS Inc. Chicago, USA). Normally distributed data are presented with mean and standard deviation (SD) as the measures of central tendency and dispersion, respectively. Correspondingly, non-normally distributed continuous data are presented with median and interquartile range (IQR, i.e., 25th and 75th percentiles), respectively. However, although many EORTC data present with a skewed distribution, here they are primarily reported with mean values and SD, as this is the preferred method in comparable studies.



**Figure 1** Eligible, excluded and included patients with newly diagnosed primary lung cancer in Southern Norway from 2002 to 2005 and response rate to questionnaires at baseline.

Differences in EORTC and HAD scores were compared between histological groups (Small Cell Lung Cancer (SCLC) vs. Non-Small Cell Lung Cancer (NSCLC) vs. unknown histology), Eastern Cooperative Oncology Group Performance Status (ECOG PS) 0–2 vs. 3–4,<sup>21</sup> Tumour Node Metastasis (TNM) stage a.m. Mountain 1a–3a vs. 3b–4.<sup>22</sup> Differences were considered statistically significant with an alpha below 0.05 ( $p < 0.05$ ), two-sided test.

HAD scores were tested both as continuous scores and categorical, the latter with a cut-off at 11 points. Simple linear regression analyses were performed with EORTC scores, HAD scores or SoC scores as dependent variables, and the following categorical variables as explanatory variables: age (cut-off:  $<70$  years = 0,  $\geq 70$  years = 1), gender (male = 0, female = 1), histology (SCLC = 0 vs. NSCLC = 1), ECOG PS (0–2 = 0, 3–4 = 1), TNM stage (1a–3a = 0, 3b–4 = 1), and anxiety and depression (score  $<11$  = 0,  $\geq 11$  = 1). EORTC-variables resulting in significant  $p$ -values, were further tested in multiple linear regression analyses with backward stepwise conditional methods. Because of skewed data, Spearman's rank correlation in stead

of simple linear regression and the effects of log-transformation of EORTC and HAD scores were also tested.

The differences between mean values from present study and values from selected EORTC databases<sup>14</sup> and the general Norwegian population,<sup>23</sup> were tested in Sample Power, version 2.0, with independent sample  $t$ -test, assuming sample sizes equal to the lowest comparable sample size tested and with actual standard deviations in calculation where available with an alpha  $< 0.05$ , two-sided test and a power  $> 80\%$ , i.e., beta  $< 0.20$ .

## Results

Of a total of 492 consecutive patients originally diagnosed with primary lung cancer, 479 patients were included in the study, giving an inclusion rate of 97% (Fig. 1).

Two-thirds of all patients were in ECOG status 0–2 at the time of diagnosis, and more than two-thirds had advanced cancer, i.e., TNM stage 3b–4 (Table 1).

Total of 63, 61 and 52% of the unselected patient population answered the EORTC, HAD and SoC questionnaires at the time of diagnosis, respectively (Table 2). Ninety-six percent of those answering EORTC questionnaires also answered the HAD questionnaires. However, the corresponding correlation between SoC and EORTC/HAD questionnaires were  $> 84\%$ .

Patients not answering the baseline EORTC questionnaire were older (mean age 70<sup>12</sup> vs. 67.0,<sup>10</sup>  $p < 0.002$ ,  $t$ -test), and more than twice as many had poor performance status (i.e., ECOG 3–4, 59%) compared to those answering (23%,  $p < 0.0001$ ,  $\chi^2$ , Table 3). Further, there were more non-responders to EORTC among those suffering from SCLC with Extensive Disease (54%) compared to those with Limited Disease (23%,  $p = 0.002$ ,  $\chi^2$ ).

Patients with unknown histology were older, more often female and in poorer ECOG status and more advanced tumour stage than patients with histology as basis for diagnosis.

Differences between groups in EORTC scores  $\geq 10$  points were evaluated, without revealing any important tendencies. We have thus chosen to focus on statistically significant differences in this presentation.

**Table 1** Baseline characteristics in an unselected sample of patients with newly diagnosed primary lung cancer in Southern Norway.

	All ( $n = 479$ )	NSCLC ( $n = 334$ )	SCLC ( $n = 102$ )	$p$ (NSCLC vs. SCLC)	No histology ( $n = 43$ )	$p$ (no histology vs. NSCLC/SCLC)
Age, years, mean (SD)	67.9 (11)	68.3 (11)	66.9(10)	n.s. ( $t$ -test)	77.4 (10)	$< 0.0001$
Gender, male, %	58	61	51	n.s. ( $\chi^2$ )	47	$< 0.05$
Never-smokers, %	5	5	4	n.s. ( $\chi^2$ )	0	
ECOG, %						
0–2	66	66	69	n.s. ( $\chi^2$ )	21	$< 0.0001$
3–4	34	34	31		79	$< 0.0001$
TNM, %						
1a–3a	28	33	11	$< 0.0001$ ( $\chi^2$ )	30	$< 0.05$
3b–4	72	67	89	$< 0.0001$ ( $\chi^2$ )	70	$< 0.05$

SCLC - small cell lung cancer; and NSCLC - non-small cell lung cancer.

Values of statistical significance in right column are tested between the "no histology" group vs. the data in italics to the left (NSCLC and/or SCLC groups).

**Table 2** Response to European Organization for Research and Treatment of Cancer Quality of Life Questionnaire Core 30 and Lung Cancer 13 (EORTC QLQ-C30 and LC 13), Hospital Anxiety and Depression Scale (HAD) and Sense of Coherence (SoC) questionnaires at baseline in an unselected sample of patients with newly diagnosed primary lung cancer in Southern Norway.

Total number of patients	All (n = 479)	NSCLC (n = 334)	SCLC (n = 102)	p (NSCLC vs. SCLC)	No histology (n = 43)	p (no histology. vs. NSCLC/SCLC)
EORTC QLQ-C30 + LC13, mean (SD) (range 0–100)				t-test		t-test
• Physical function	56.4 (29)	57.4 (29)	56.1 (29)		43.3 (28)	
• Role function	41.1 (38)	41.8 (38)	38.3 (39)		41.7 (43)	
• Emotional function	70.7 (26)	70.0 (26)	73.2 (25)		70.3 (29)	
• Social function	62.1 (34)	62.4 (34)	58.5 (35)		70.8 (27)	
• Cognitive function	77.3 (27)	78.4 (27)	74.4 (27)		71.9 (35)	
• Overall quality of life	49.4 (26)	49.0 (26)	49.6 (25)		54.7 (23)	
• Fatigue	52.7 (31)	50.2 (31)	61.7 (30)	0.013	55.6 (32)	
• Nausea/vomiting	10.1 (20)	9.2 (19)	13.9 (24)		8.3 (15)	
• Pain	31.7 (35)	30.5 (35)	35.8 (36)		32.3 (33)	
• Dyspnoea	52.3 (34)	51.1 (35)	55.6 (33)		56.3 (36)	
• Insomnia	38.8 (37)	37.1 (38)	40.0 (36)		58.3 (31)	0.03
• Appetite loss	35.8 (39)	35.0 (39)	40.6 (39)		29.2 (42)	
• Constipation	25.4 (34)	24.1 (34)	26.6 (34)		39.6 (41)	
• Diarrhoea	12.1 (22)	11.2 (22)	15.8 (22)		11.1 (21)	
• Financial difficulties	7.2 (21)	8.1 (22)	5.2 (20)		2.1 (8)	
• Dysphagia	11.4 (26)	10.5 (25)	15.0 (30)		10.4 (26)	
• Cough	38.4 (29)	37.3 (30)	43.3 (26)		35.4 (37)	
• Dyspnoea lung cancer	39.4 (29)	37.6 (29)	43.2 (27)		50.3 (34)	
• Haemoptysis	6.7 (18)	6.7 (18)	7.2 (17)		4.2 (11)	
• Sore mouth	9.6 (24)	7.6 (21)	15.6 (31)	0.031	14.6 (30)	
• Peripheral neuropathy	13.2 (25)	11.7 (23)	16.4 (30)		22.9 (29)	
• Alopecia	5.1 (17)	4.9 (16)	6.1 (20)		4.2 (11)	
• Pain in chest	19.4 (28)	19.7 (29)	20.3 (26)		12.5 (24)	
• Pain in other places	23.1 (34)	21.1 (33)	28.1 (37)		31.0 (42)	
• Pain in arm/shoulder	22.4 (32)	22.9 (33)	16.4 (27)		37.5 (38)	
HAD						
• Anxiety, %	17	17	17		20	
• Depression, %	14	12	22	0.03 ( $\chi^2$ )	27	
SoC						
• Mean (SD), (range 13–91)	58.3 (7)	58.2 (7)	59.4 (8)		56.3 (9)	

All non-significant p-values are not printed to increase readability.

SCLC - small cell lung cancer; and NSCLC - non-small cell lung cancer.

Values of statistical significance in right column are tested between the "no histology" group vs. the data in italics to the left (NSCLC and/or SCLC groups).

According to EORTC, fatigue and sore mouth were more prevalent in patients with newly diagnosed SCLC compared to NSCLC ( $p = 0.013$  and  $p = 0.031$ , respectively). Besides this, the EORTC, HAD and SoC scores were comparable between SCLC and NSCLC (Table 2).

Mean EORTC scores were significantly poorer in cases of reduced performance status (Fig. 2).

Highly significant associations were seen between EORTC scores and anxiety and depression (Fig. 3). Linear regression analysis with EORTC as dependent variable, showed poorer emotional function in cases of anxiety or depression (all  $p$ 's  $< 0.0001$ , highest  $r^2 = 0.51$ ), and worse physical and role functions in cases of poor ECOG performance status ( $p$ 's  $< 0.0001$ , highest  $r^2 = 0.22$ ). Some of the other EORTC parameters showed significant  $p$ -values, but insignificant  $r^2$

( $< 0.10$ ). Multiple logistic regression analysis showed a four times increased odds ratio (OR) for depression if ECOG performance status was 3–4 compared to 0–2, i.e. 30% had depression in ECOG 3–4 while 10% had depression if ECOG 0–2 ( $p = 0.001$ ). There was a 10 times higher OR for depression if concurrent anxiety, i.e. 42% of those with anxiety had depression vs. 8% of patients without anxiety having depression ( $p < 0.0001$ ).

Regarding psychiatric disease according to HAD, 17% and 14% had scores  $\geq 11$ , consistent with anxiety and depression, respectively. Seven percent scored  $\geq 11$  on both subscales, consistent with combined anxiety and depression, thus one in four (24%) had scores consistent with one or more mood disorders (Fig. 4). Ten percent had anxiety only and seven percent depression only. Thirty-one

**Table 3** Characteristics of an unselected population of patients with lung cancer in Southern Norway answering EORTC questionnaires at baseline compared with those who did not.

	EORTC non-responders	EORTC responders	<i>p</i> (test)
Age, mean (SD)	69.3 (11)	67.1 (10)	0.031 ( <i>t</i> -test)
Sex, female %	45	23	n.s. ( $\chi^2$ )
ECOG 3–4, %	53	23	<0.0001 ( $\chi^2$ )
SCLC-ED, %	54	23	0.002 ( $\chi^2$ )
No histology vs. all others (NSCLC + SCLC), %	15	5	<0.0001 ( $\chi^2$ )

percent showed symptoms qualifying for borderline anxiety, and 27% for borderline depressions (scores  $\geq 8$ ). There were no statistically significant differences between median scores for either anxiety or depression between genders or histological groups.

Anxious, as well as depressed patients, reported significantly more fatigue, insomnia, sore mouth, nausea, dysphagia and financial trouble than non-anxious and non-depressed patients (all  $p$ 's < 0.027). Patients with combined mood disorders reported worse physical ( $\Delta 20$ ), role ( $\Delta 20$ ), emotional ( $\Delta 41$ ), social ( $\Delta 24$ ) and cognitive function ( $\Delta 22$ ), and global HRQL ( $\Delta 18$ ) scores, (all  $p$ 's < 0.03).

Sense of Coherence scores were normally distributed and ranged from 34 to 76. There were no differences in SoC scores between genders, histological groups, ECOG or TNM, but scores were lower in anxious patients, compared to non-anxious, i.e., for manifest anxiety (HAD score  $\geq 11$ ) 55.7 vs. 58.8 ( $p = 0.025$ ) and for borderline anxiety (HAD score  $\geq 8$ ) 56.3 vs. 59.2 ( $p = 0.005$ ), respectively. If depression scores were  $\geq 8$ , mean SoC scores were also significantly lower compared to non-depressed, i.e., 55.4 vs. 59.2 ( $p = 0.001$ ) and if score  $\geq 11$ , 55.2 vs. 58.6 ( $p = 0.035$ ), respectively (Fig. 2). In cases of combined mood disorders, SoC scores were lower, 52.0 vs. 58.6 ( $p = 0.006$ ). The SoC scores did not influence the EORTC scores in simple linear regression analyses, but there was a significant association between SoC score and EORTC emotional function and diarrhoea using Spearman's rank correlation ( $p$ 's < 0.002). SoC scores showed no associations with ECOG status or with length of education.

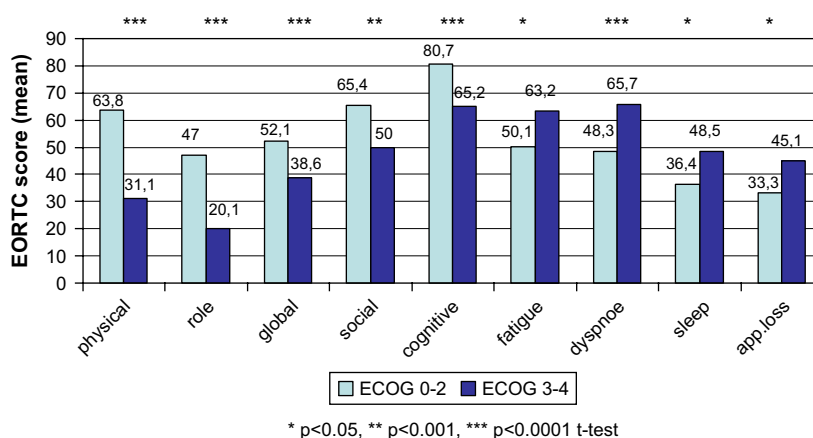
When compared with material from EORTC databases,<sup>13</sup> reporting data from treatment studies with the inclusion of patients in good performance status, unselected patients with newly diagnosed lung cancer report considerably worse EORTC scores, especially related to role, social and physical functions as well as global quality of life, and regarding symptoms related to dyspnoea, diarrhoea and fatigue (Fig. 5).

## Discussion

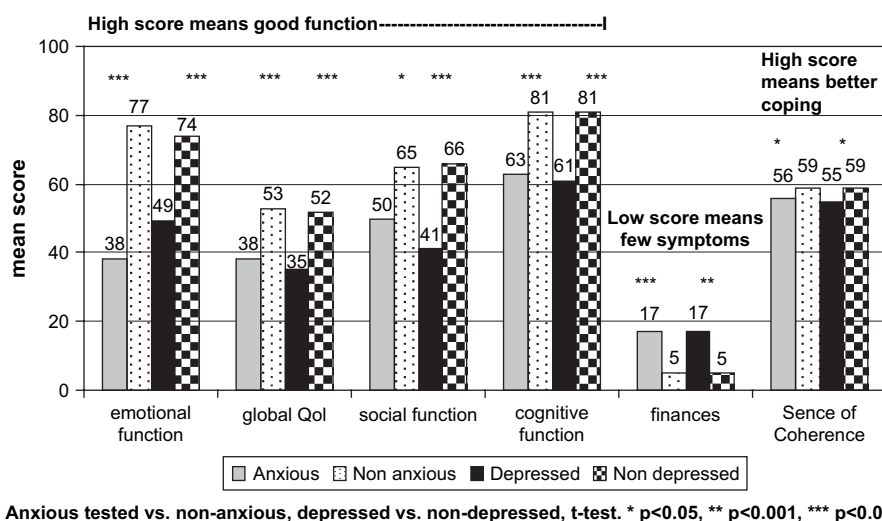
This prospective study on an unselected population of patients with newly diagnosed lung cancer revealed that 2/3 of patients were in good performance status at the time of diagnosis, and more than 2/3 had advanced tumour stage. Fatigue and sore mouth were more pronounced in small cell lung cancer (SCLC) than in non-small cell lung cancer (NSCLC). Besides this, there were no differences in EORTC scores between SCLC and NSCLC.

Mean EORTC scores (physical, role, social, cognitive and global HRQL functioning scales, fatigue and dyspnoea) were significantly poorer in cases of reduced performance status in all patients with lung cancer.

One in four patients with newly diagnosed lung cancer had scores consistent with manifest anxiety and/or depression. Global HRQL score, as well as function scores and several symptom scores, proved statistically significantly worse in patients with HAD scores compatible with anxiety and/or depression, compared to those without. Further,

**Figure 2** EORTC scores differing significantly between ECOG PS 0–2 and 3–4 in an unselected population of patients with primary lung cancer in Southern Norway.





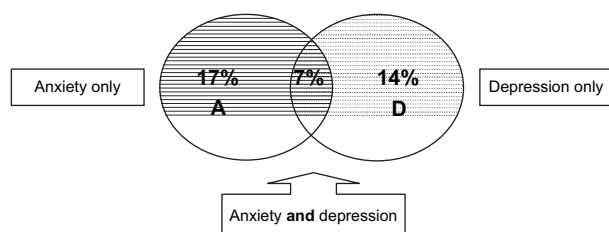
**Figure 3** Specific baseline EORTC and Sense of Coherence scores in anxious vs. non-anxious and depressed vs. non-depressed patients in an unselected sample with newly diagnosed primary lung cancer in Southern Norway.

patients with combined mood disorders scored poorer than those with either anxiety or depression, especially concerning emotional, cognitive and social functions, and global quality of life, thus emphasizing the association between mood disorders and HRQL. Patients with anxiety and depression had a lower Sense of Coherence score, and there was an increased OR for depression in patients with poor performance status<sup>3,4</sup> or anxiety.

Patients in this real-life study on newly diagnosed NSCLC scored worse on several function and symptom scales than in "reference databases" from EORTC-studies, i.e., patients well enough for inclusion in chemo- or radiotherapy treatment protocols,<sup>13</sup> and not surprisingly much worse when compared with a randomly chosen, healthy Norwegian population,<sup>23</sup> thus revealing a more true and heavier burden of illness than in previous studies in lung cancer.

The major critical comment to this study would be a low response rate to questionnaires, introducing a considerable possibility of selection bias. However, there are many reasons for not answering questionnaires in this context.

- (i) First, some were too sick or fatigued to answer. When handling an unselected sample of patients with newly diagnosed lung cancer, a higher proportion of patients will be in advanced tumour stage or reduced ECOG status compared to studies

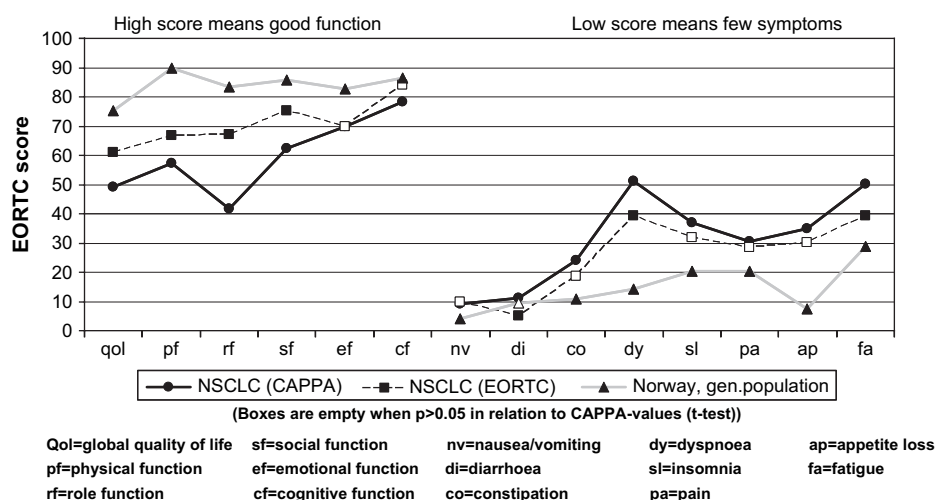


**Figure 4** Anxiety, depression and both in an unselected population of patients with primary lung cancer in Southern Norway.

performed alongside for example chemotherapy studies, that include mostly patients in ECOG status 0–1 or Karnofsky (60–) 80–100. If only patients in ECOG 0–1 had been included, the response rate in this study on HRQL would have been 89%. Further, the relationship between ECOG status and response rate is tested to be strong in this study and thus explains a high proportion of dropouts.

- (ii) Second, some felt too shocked to answer questionnaires shortly after being told the diagnosis. Although a general problem in such studies, this justification evidently must be of greater importance than in comparable, but highly selected studies, due to a very high inclusion rate of 97%. Hence, a higher proportion will, due to emotional reactions, not answer questionnaires in such unselected materials.
- (iii) Third, several patients definitely refused to answer the SoC questionnaire, as they found the questions too personal.
- (iv) Fourth, for those answering questionnaires by mail, several patients referred for surgery were not reached before being hospitalised for surgery. Questionnaires should according to the protocol be answered in the current condition, and not retrospectively.
- (v) Eighty-four percent of patients responding to EORTC and HAD within 14 days of diagnosis, also answered the SoC. If including later answers in analyses, as well, response rates would have been better, but less so reflecting baseline characteristics.

We thus believe the response rates reported in this study are high standards for an unselected sample of patients with newly diagnosed lung cancer. However, this does not reduce the possibility of selection bias. On the basis of these arguments, our opinion is that the EORTC, HAD and SoC scores in general most probably would have been worse than reported here, if a higher proportion of those with a poor ECOG status also had been able to answer.



**Figure 5** Health related quality of life scores according to EORTC QLQ-C30 in an unselected sample of patients with newly diagnosed non-small cell lung cancer in Southern Norway (CAPPA) compared with a selected material from EORTC databases (chemotherapy- and radiotherapy studies<sup>13</sup>) and with a sample from the Norwegian general population.<sup>23</sup>

The EORTC questionnaires are made with the intention to test changes in patients selected for chemotherapy or radiation therapy studies. In this study on an unselected sample of patients with newly diagnosed lung cancer, we found the EORTC scores to be more skewed and with wider ranges of scores than in previous treatment studies.<sup>24,25</sup> This skewedness is most probably due to the inclusion of more diseased patients in this material, with more than two-thirds being in advanced tumour stage at inclusion, and one-third being in a poor performance status, the latter being synonymous with exclusion criteria in most modern treatment studies. Such skewedness puts a further challenge in the applied statistics used for analyses of data from unselected materials, like in this study.

Many of the same arguments should explain why the EORTC scores from this study were poorer than comparable values from previous EORTC-studies (Fig. 5). Further, more persons suffered from anxiety and/or depression in this study compared to another Norwegian study by Aass et al.,<sup>26</sup> a result also indicating the worse status of an unselected sample. However, while this study evaluated all patients with lung cancer during a three-year period, her study was performed at a specialized cancer clinic, only receiving patients well enough for specific treatment, and including only a small proportion (8%) of patients suffering from lung cancer.

Regarding the general applicability of these results, missing a clear trend in scores, and there being no common score of the EORTC HRQL-questionnaire, makes this questionnaire less useful to guide clinical evaluations in an unselected material of patients with lung cancer.

One might argue that depression scores after information about the serious diagnosis of malignant disease, not necessarily mirror the pre-diagnostic state as precisely as if measured ahead of information. Pre-diagnostic questioning was not considered ethical in this study. However, Montazeri et al.<sup>15</sup> found no significant differences in HRQL symptom scores, using the EORTC questionnaires, between patients who knew their diagnosis and those who did not, which may support the validity of our results regarding mood disorders.

Compared with results from a nation-wide sample on 2003 randomly selected Swedish inhabitants with mean SoC score of 65,<sup>20</sup> the SoC scores in this study were lower for both genders. There are few comparable studies on SoC scores among cancer patients. The most comparable values are from a study on US minority homeless women, scoring 55.0, indicating that the average patient with SoC score of 58 is less capable of activating appropriate resources to cope with serious happenings compared to a healthy population.<sup>18,20</sup> It has been shown that SoC is strongly, inversely related to the trait of anxiety.<sup>19</sup> Antonovsky<sup>4</sup> has stated that most of the experiences contributing to an individual's mastery or sense of coherence, are collected during childhood and early adulthood, and stabilise around the age of 30. If so, one can hardly claim that a low SoC score is caused or should be affected by the diagnosis of cancer. However, Larsson and Kallenberg found that SoC was more related to general well-being and psychological factors than to overall physical health and somatic symptoms.<sup>20</sup>

One-third of patients in our study scored equal to borderline anxiety, and one-fourth as borderline depression. These also had significantly lower SoC scores. Meanwhile, Dalgard et al. have shown that a low level of education is often associated with a low degree of mastery and high psychological distress.<sup>27</sup> However, our study did not show different sense of coherence scores in lung cancer patients with high education compared to low, but statistical power was low due to few patients with four or more years of higher education.

Another question is whether people with depression smoke more than others or tend to start smoking more frequently than persons without mood disorders, and are thus over represented in a material of patients with pulmonary carcinoma, giving a selection bias in such materials. A topic for future research could be to focus more on smoking habits in people suffering from mood-related disorders, as they seem to represent a group with increased risk for lung cancer, and possibly other tobacco-associated disorders.

Patients with anxiety or depression were found to have more symptoms from lung cancer and reduced quality of life at baseline compared to patients without mood-related disorders. However, we are not able to comment from this material whether treatment with anxiolytics or antidepressants might reduce these perceptions of symptoms from lung cancer, and is thus a possible topic for future research.

Our findings in this real-life study establish the considerable burden of illness found in an unselected sample of lung cancer and may emphasize the necessity for more time spent on information and follow-up for patients suffering from mood disorders and a low coping ability in order to improve their HRQL, thereby possibly reducing their burden of symptoms.

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## Conflict of interest statement

The authors have no conflict of interest.

## Ethical approval

The study was approved by the regional ethics committee. All patients gave informed consent.

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